



## CORRELATION TIMI SCORE AND MAJOR ADVERSE CARDIOVASCULAR EVENTS IN NSTEMI-ACS PATIENTS

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<p><b>Info Article</b></p> <p>Received : 01 Januari 2026</p> <p>Revised : 04 Februari 2026</p> <p>Accepted : 03 Maret 2026</p> <p>Publication : 31 Maret 2026</p>	<p><b>Abstract:</b> <i>Non-ST Elevation Acute Coronary Syndrome (NSTEMI-ACS) is a serious cardiovascular condition associated with a high risk of Major Adverse Cardiovascular Events (MACE), including death, recurrent myocardial infarction, heart failure, arrhythmia, and the need for revascularization. Therefore, accurate risk stratification is crucial for optimal clinical management. This study employed a retrospective analytical observational design to examine the relationship between the Thrombolysis in Myocardial Infarction (TIMI) score and the occurrence of MACE in 69 patients selected purposively from hospital medical records. TIMI scores were categorized as low, intermediate, or high, while MACE events were identified based on clinical records. The results showed that most patients were male (59.4%) aged 45–64 years (53.6%), with the majority having intermediate TIMI scores (68.1%). MACE events occurred more frequently in patients with intermediate and high TIMI scores. Gamma correlation analysis indicated a strong and significant association between TIMI scores and MACE (<math>r = 0.881</math>; <math>p &lt; 0.001</math>). These findings suggest that the TIMI score is an effective tool for clinical risk stratification in NSTEMI-ACS patients.</i></p>
<p><b>Keywords:</b> MACE, Non-ST Elevation Acute Coronary Syndrome, TIMI Score</p> <p><b>Kata Kunci:</b> MACE, Sindrom Koroner Akut Non-ST Elevasi, Skor TIMI</p>	
<p><b>Licensed Under a Creative Commons Attribution 4.0 International License</b></p> 	<p><b>Abstrak:</b> Sindrom Koroner Akut Non-ST Elevasi (NSTEMI-ACS) merupakan kondisi kardiovaskular serius yang memiliki risiko tinggi terhadap terjadinya Major Adverse Cardiovascular Events (MACE), seperti kematian, infark miokard berulang, gagal jantung, aritmia, dan kebutuhan revaskularisasi. Oleh karena itu, stratifikasi risiko yang tepat sangat penting untuk pengelolaan klinis pasien. Penelitian ini menggunakan desain observasional analitik retrospektif untuk menganalisis hubungan antara skor Thrombolysis in Myocardial Infarction (TIMI) dengan kejadian MACE pada 69 pasien yang dipilih secara purposive dari rekam medis rumah sakit. Skor TIMI diklasifikasikan ke dalam kategori rendah, sedang, dan tinggi, sedangkan MACE diidentifikasi berdasarkan rekam medis klinis. Hasil menunjukkan bahwa mayoritas pasien adalah laki-laki (59,4%) berusia 45–64 tahun (53,6%), dengan skor TIMI kategori sedang paling banyak (68,1%). Kejadian MACE lebih sering terjadi pada pasien dengan skor TIMI sedang dan tinggi. Analisis statistik menggunakan uji Gamma menunjukkan hubungan yang kuat dan signifikan antara skor TIMI dan MACE (<math>r = 0,881</math>; <math>p &lt; 0,001</math>). Hal ini menegaskan bahwa skor TIMI efektif sebagai alat stratifikasi risiko klinis pada pasien NSTEMI-ACS.</p>

## INTRODUCTION

*Non-communicable diseases* (NCDs) are a major contributing factor to high mortality rates worldwide. Of the various NCDs, cardiovascular disease is the leading cause of death. This disease can lead to disability and death in both developing and developed countries. Cardiovascular disease encompasses disorders of the heart and blood vessels. One of the most common types of cardiovascular disease is *Coronary Heart Disease* (CHD) (Tampubolon et al., 2023). *Coronary heart disease* (CHD) is a disorder of one or more coronary blood vessels characterized by thickening of the blood vessel walls and plaque buildup that restricts blood flow to the heart muscle, thus impairing heart function. In general, risk factors for CHD include smoking, obesity, lack of physical activity, and high blood pressure (*hypertension*) (Christy et al., 2021).

According to the 2020 World Health Organization (WHO) report, the prevalence of cardiovascular disease is responsible for approximately 25% of global deaths and continues to increase, including in Southeast Asia. In the United States, cardiovascular disease is the leading cause of death, with 836,456 cases, and approximately 43.8% of these are due to coronary heart disease (Tambunan & Baringbing, 2018). According to 2020 data from the Indonesian Ministry of Health, the prevalence of CHD in Indonesia remains relatively high, with 352,618 cases recorded in men and 442,674 cases in women. By age group, the highest prevalence rate occurs in individuals aged 65–74 years, with a prevalence of 3%. This means that approximately 3 to 4 out of every 100 people in that age range suffer from CHD (Yanti et al., 2024a).

The incidence of coronary heart disease, based on a diagnosis by a cardiologist, among the entire population of Jambi Province is recorded at 0.9%–1.1%, or approximately 13,692 people. Based on location of residence, the prevalence is higher in urban areas, with a prevalence of 1.7%, or approximately 556,419 people, compared to rural areas, which only reached 1.3%, or 460,871 people. Meanwhile, based on occupation, the highest rate is found among government officials such as civil servants, the Indonesian National Armed Forces (TNI), and the Indonesian National Police (Polri), with a prevalence of 2.7% (Elvita Nora Susana et al., 2024)

The main clinical manifestation of CHD is *Acute Coronary Syndrome* (ACS) (Lita & Kep, 2021). ACS is a critical condition resulting from acute myocardial ischemia caused by the rupture of atherosclerotic plaque in a coronary artery. This plaque rupture triggers the formation of a thrombus, which can narrow or completely block coronary blood flow. This condition has the potential to lead to serious complications such as

*Unstable Angina Pectoris* (UA), *Acute Myocardial Infarction* (AMI), sudden cardiac arrest, and even death. One of the early manifestations of the acute phase of myocardial infarction is hyperglycemia, which can occur in both patients with and without a history of diabetes mellitus (Yanti et al., 2024b).

ACS is generally divided into two main categories: *ST-Elevation Myocardial Infarction* (STEMI) and *Non-ST Elevation Acute Coronary Syndrome* (NSTEMI-ACS), which includes *Unstable Angina Pectoris* (UAP) and *Non-ST Elevation Myocardial Infarction* (NSTEMI). Pathophysiologically, ACS arises from a complex interaction between atherosclerosis, inflammation of the blood vessel wall, and activation of the thrombotic system, which together cause acute myocardial ischemia. In NSTEMI-ACS, rupture or erosion of atherosclerotic plaque in the coronary artery causes the formation of a non-occlusive thrombus. So, although blood flow is not completely stopped, the oxygen supply to the heart muscle is reduced and causes ischemia and recurrent myocardial injury (Pablo et al., 2024). This pathological process is often initiated by chronic inflammatory activation, which increases the susceptibility of atherosclerotic plaques to rupture. Macrophages and proinflammatory mediators such as cytokines play a role in thinning the fibrous cap and reducing plaque stability (Theofilis et al., 2023). In addition to plaque rupture, other factors such as plaque surface erosion, calcified nodule formation, and endothelial dysfunction also play a role in the development of NSTEMI-ACS. Meanwhile, classic risk factors such as hypertension, dyslipidemia, diabetes mellitus, and smoking accelerate the atherothrombotic process through increased oxidative stress and vascular dysfunction (Nardin et al., 2023). Although the thrombus in NSTEMI-ACS does not completely occlude the arterial lumen as in STEMI, this condition is still associated with high morbidity and mortality rates, especially in individuals with multiple risk factors and high clinical scores.

Patients with unstable angina pectoris and non-ST elevation myocardial infarction are a diverse group. Those classified as low-risk generally have a good prognosis with conventional therapy, while high-risk patients require more aggressive antithrombotic therapy and invasive procedures. Mortality in patients with unstable angina pectoris is recorded as less than 1.7%, while in patients with non-ST elevation myocardial infarction it is below 5.1% based on short-term observation of 30 days. However, long-term follow-up found similar rates of nonfatal events and increased mortality in patients with unstable angina pectoris and non-ST elevation myocardial infarction (Savovic et al., 2016a). One of the factors causing death in patients with acute coronary syndrome is the emergence

of complications called *Major Adverse Cardiovascular Events* (MACE). MACE is generally defined as a combination of non-fatal stroke, non-fatal myocardial infarction, or death from cardiovascular causes. In some cases, the definition is expanded to include heart failure, coronary revascularization procedures, and other ischemic cardiovascular events. Various factors have been identified as predictors of MACE in patients with ACS, but the exact cause of MACE after patients receive ACS treatment remains incompletely understood (Dewi et al., 2022).

MACE in NSTEMI-ACS patients generally occur early after treatment or hospitalization, particularly within the first few days to months after the acute event. Research in Indonesia by Ginanjar (Ginanjar et al., n.d.) reported that nearly half of all MACE events (48.9%) occurred within the first 24 hours, followed by 8.5% on the second day and 10.6% on the third day, suggesting that the first three days are the most critical period for patients. Consistent results were found in the European ARTICA Trial, where the highest risk of MACE was observed within the first 30 days after treatment, with incidence rates ranging from 3.9–4.2%, and decreasing after the first month (Camaro et al., 2023). Meanwhile, a multinational cohort study in Asia by Cheng (Cheng et al., 2025) found that MACE events were most common in the first six months, with an incidence of 6.8% at 30 days and a gradual increase up to 12 months. Overall, these findings confirm that the period from 30 days to six months after NSTEMI-ACS treatment is the highest risk phase for MACE, necessitating intensive monitoring and aggressive preventive strategies during this period. Therefore, appropriate risk stratification is key in the management of non-ST-elevation acute coronary syndromes, as it can help determine the need for early invasive strategies, optimize medical therapy, and ultimately improve patient outcomes (Sivam et al., 2025).

Rapid and accurate risk stratification is needed to identify patients at high risk of complications and determine who requires intensive care and early intervention. To this end, several scoring systems have been developed to assess the risk of MACE. Of these, the two most commonly used are the *Global Registry of Acute Coronary Events* (GRACE) score and the *Thrombolysis in Myocardial Infarction* (TIMI) score (Ilyas et al., 2020). The TIMI score evaluates a number of clinical risk factors and estimates the prognosis of patients with non-ST elevation acute coronary syndrome. This approach allows medical personnel to more easily determine appropriate management steps for the patient's condition (Sawalha et al., 2021). The TIMI risk score emphasizes seven independent factors, most of which are based on risk factors: age over 65 years, having

more than three risk factors for coronary artery disease, coronary artery disease proven by arteriography with  $\geq 50\%$  narrowing, ST-segment depression  $\geq 0.5$  mm on ECG, having more than two anginal episodes in the past 24 hours, a history of aspirin use in the past week, and having elevated levels of markers of myocardial necrosis. Based on this score, a patient's risk of death, myocardial infarction, or requiring emergency revascularization within 14 days increases with increasing score: 8.3% at a score of 2, 19.9% at a score of 4, and up to 40.9% at a score of 6–7 (Savovic et al., 2016b).

Khan's research included a prospective study of 1,654 patients with chest pain presenting to the emergency department at Khyber Teaching Hospital in Pakistan. The findings demonstrated that the TIMI risk score was able to stratify the risk of major cardiovascular events within 30 days, with the incidence increasing from 2.6% at a score of 0 to 100% at a score of 7. The variable most associated with poor outcomes was elevated troponin hs-I when patients first arrived at the emergency department. These results confirm that the TIMI score is a simple yet effective method for early risk assessment in patients with chest pain and acute coronary syndrome (Khan, et al., 2022). Another study conducted by Ali conducted a retrospective study of 250 NSTEMI patients at two tertiary referral hospitals in Pakistan to assess the prognostic ability of the TIMI risk score. The results showed that a TIMI score  $\geq 4$  was associated with a significantly increased 14-day mortality rate (11.2% compared to 3.4%;  $p < 0.001$ ). The ROC test showed an AUC of 0.788 with a sensitivity of 77.8% and a specificity of 68.08%, confirming the accuracy of this score in short-term risk stratification. In addition, the TIMI score along with a history of cardiac arrest was identified as an independent predictor of mortality (Ali et al., 2023).

A preliminary study of medical records at Raden Mattaher Regional Hospital in Jambi noted that throughout 2024, 263 patients with non-ST elevation acute coronary syndrome were admitted. This number confirms that non-ST elevation acute coronary syndrome remains one of the most frequently encountered acute cardiovascular conditions at the hospital. Looking at the trend over the past three years, the number of cases has increased from 195 in 2022 to 286 in 2023 and 263 in 2024. This fluctuation indicates the need for serious attention in patient care, including early diagnosis, accurate risk assessment, and rapid and appropriate medical intervention, particularly in referral hospitals like Raden Mattaher Regional Hospital, which serve a wide range of communities. Interviews conducted by researchers with patients with NSTEMI-ACS at Raden Mattaher Regional Hospital in Jambi indicate that most patients admitted were not

experiencing this condition for the first time. The patient stated that the current symptoms were a recurrence of previous attacks, indicating progressive coronary artery disease. These recurrent attacks indicate a high risk of developing MACE, such as acute myocardial infarction or the need for emergency revascularization. Therefore, this preliminary study emphasizes the importance of using risk stratification tools such as the TIMI score to assess patient severity and predict the likelihood of MACE, allowing for more timely, accurate, and targeted management.

## **METHOD**

This is a quantitative study with an observational analytical approach and a retrospective cross-sectional design. The study was conducted at Raden Mattaher Regional Hospital in Jambi for two weeks in December 2025. The study population consisted of all medical records of 174 patients diagnosed with UA/NSTEMI from October 2024 to September 2025. The sample was selected using purposive sampling, using the Slovin formula, resulting in 63 samples. A 10% increase was then made to anticipate dropout, resulting in 69 samples. The research instruments used were the TIMI Risk Score for UA/NSTEMI and MACE. The data collection method for this study used secondary data sourced from the medical records of patients with non-ST-elevation acute coronary syndrome at Raden Mattaher Regional Hospital, Jambi Province, from October 2024 to September 2025. Data collection was conducted in three stages: preparation (location determination, preliminary study, and permitting), implementation (two weeks of medical record data collection and TIMI score assessment), and final stage (reporting, processing, and presentation of research results).

Data processing was performed using SPSS through editing, coding, data entry, tabulation, and cleaning to ensure data accuracy and validity. This study used univariate and bivariate analyses. Univariate analysis aimed to describe the characteristics of respondents and the distribution of study variables in the form of frequency tables. Numeric variables such as age are presented as mean, standard deviation (SD), and distribution of age categories (<45, 45–64, ≥65) and IQR. Categorical variables such as gender, Thrombolysis in Myocardial Infarction score category (low, medium, high), and MACE incidence (yes/no) are presented in frequency and percentage. The bivariate analysis began with a normality test to determine the appropriate statistical method. The relationship between TIMI score and MACE incidence was analyzed using the Gamma test because both variables are ordinal. Results are presented in a cross-table with

correlation coefficient ( $r$ ) and  $p$ -value. Interpretation is based on  $p < 0.05$  to determine statistical significance and the strength and direction of the relationship.

## RESULTS AND DISCUSSION

### Results

#### *Univariate Analysis Results*

Table 1. Frequency distribution of patients with NSTEMI-ACS based on age and gender (N=69)

Category	Frequency	Percentage (%)
<b>Age</b>		
<45 years	14	20.3
45–64 years	37	53.6
>65 years	18	26.1
<b>Total</b>	69	100
<b>Gender</b>		
Male	41	59.4
Female	28	40.6
<b>Total</b>	69	100

Based on Table 1, of the total 69 patients with NSTEMI-ACS, the majority were in the 45–64 years age group, as many as 37 people (53.6%), indicating a predominance of adult to elderly patients. Based on gender, the majority of respondents were male, as many as 41 people (59.4%), while women numbered 28 people (40.6%), so it can be concluded that patients with non-ST elevation acute coronary syndrome in this study were more male.

Table 2. Frequency distribution of patients with NSTEMI-ACS based on risk factors. (N=69)

Risk Factor	Category	Frequency	Percentage (%)
History of Diabetes Mellitus	Yes	39	56.5
	No	30	43.5
	<b>Total</b>	69	100
History of Hypertension	Yes	37	53.6
	No	32	46.4
	<b>Total</b>	69	100
History of Dyslipidemia	Yes	32	46.4
	No	37	53.6
	<b>Total</b>	69	100
Smoking History	Yes	35	50.7
	No	34	49.3
	<b>Total</b>	69	100
Obesity	Yes	17	24.6
	No	52	75.4
	<b>Total</b>	69	100
History of Coronary Heart Disease	Yes	49	71.0
	No	20	29.0
	<b>Total</b>	69	100

Based on Table 2, the distribution of risk factors in patients with NSTEMI-ACS shows that a history of diabetes mellitus was found in 39 respondents (56.5%). Most respondents also had a history of hypertension, as many as 37 people (53.6%). In the dyslipidemia factor, more respondents did not have a history of dyslipidemia, namely 37 people (53.6%). Based on smoking history, the proportion of respondents was relatively balanced between those with a history of smoking (35 people; 50.7%) and those without (34 people; 49.3%). In terms of obesity status, the majority of respondents were not obese, as many as 52 people (75.4%). Meanwhile, in terms of CHD, most respondents had a history of CHD, namely 49 people (71%).

**Table 3. Distribution of TIMI Scores in Patients with NSTEMI-ACS. (N=69)**

<b>TIMI Risk Category</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Low	14	20.3
Moderate	47	68.1
High	8	11.6
<b>Total</b>	<b>69</b>	<b>100</b>

Based on Table 3, the distribution of TIMI scores in patients with NSTEMI-ACS shows that the majority of respondents were in the moderate risk category, namely 47 people (68.1%). Furthermore, respondents in the low risk category numbered 14 people (20.3%), while respondents in the high risk category numbered 8 people (11.6%).

**Table 4. Distribution of MACE events in patients with NSTEMI-ACS. (N=69)**

<b>MACE Occurrence</b>	<b>Frequency</b>	<b>Percentage (%)</b>
No MACE	23	33.3
MACE Occurred	46	66.7
<b>Total</b>	<b>69</b>	<b>100</b>

Based on Table 4, the distribution of MACE events during the treatment period in patients with NSTEMI-ACS shows that of the total 69 patients, the majority experienced MACE, namely 46 patients (66.7%), while the other 23 patients (33.3%) did not experience MACE.

**Table 5. Distribution of MACE events based on diagnosis in patients with NSTEMI-ACS (N=69)**

<b>MACE Outcome</b>	<b>UAP</b>	<b>NSTEMI</b>	<b>Percentage (%)</b>
No MACE	13	10	33.3
Death	0	5	7.2
Recurrent Myocardial Infarction	10	9	27.5
Stroke	0	1	1.4
Heart Failure	1	1	2.9
Revascularization	8	11	27.5
<b>Total</b>	<b>32</b>	<b>37</b>	<b>100</b>

Based on Table 5, of the 69 patients with NSTEMI-ACS, 32 were diagnosed with UAP and 37 with NSTEMI. MACE occurred more frequently in NSTEMI patients than UAP, especially in revascularization outcomes, with 11 patients with NSTEMI and 8 with UAP (27.5%). Recurrent myocardial infarction (MRI) was relatively equal between NSTEMI (9 patients) and UAP (10 patients). Death and stroke were only found in the NSTEMI group, while heart failure was found in equal numbers in both groups. Meanwhile, the proportion of patients without MACE was relatively similar across both diagnoses.

### Bivariate Analysis Results

**Tabel 6. Relationship between TIMI Score and MACE (N=69)**

TIMI Score	No MACE n (%)	MACE n (%)	Total n (%)	r-value	p-value
Low	11 (78.6)	3 (21.4)	14 (100)	0.881	<0.001
Moderate	12 (25.5)	35 (74.5)	47 (100)		
High	0 (0.0)	8 (100)	8 (100)		
<b>Total</b>	23 (33.3)	46 (66.7)	69 (100)		

Based on Table 6, in the group of patients with low TIMI scores, most patients did not experience MACE, namely 11 people (78.6%), while 3 people (21.4%) experienced MACE. In the group with moderate TIMI scores, most patients experienced MACE, namely 35 people (74.5%), while 12 people (25.5%) did not experience MACE. All patients with high TIMI scores, namely 8 people (100%), experienced MACE. The results of the Gamma test showed a strong relationship between TIMI scores and MACE events ( $r = 0.881$ ;  $p < 0.001$ ).

### Respondent Characteristic

The characteristics of the respondents in this study indicate that most were in the 45–64-year age range. This result is consistent with the findings of Ahmed who stated that atherosclerosis, which develops progressively with age, is the primary pathogenetic mechanism for myocardial ischemia (Ahmed et al., 2013). Ruiz-García's research shows that the accumulation of atherosclerotic plaque in blood vessels increases with the aging process (Ruiz-garcía et al., 2021). Meanwhile, Wang emphasized that metabolic changes and impaired vascular endothelial function in middle adulthood play a role in accelerating plaque formation (Wang et al., 2025). Based on gender characteristics, this study shows that the proportion of male respondents is higher than female, at 59.4%. This finding aligns with research conducted by Anna Marza, which is also consistent with global reports that Acute Coronary Syndrome is generally more common in men than women, especially before old age (Marzà-florensa et al., 2025). Another study conducted by Jim

and Joseph showed that in patients with acute coronary syndrome, including NSTEMI and UA, the proportion of men was greater than women, with a percentage of 64.5% in NSTEMI patients and 56.6% in UA patients (Jim & Joseph, 2016). In addition, Ahmed emphasized the existence of differences in characteristics based on gender in the context of ACS, including differences in age distribution and risk profiles, where women tend to experience ACS at an older age, while men are more often found in the middle adult age group (Ahmed et al., 2013).

Based on the risk factors in this study, it was shown that diabetes mellitus, hypertension, a history of smoking, and a history of coronary heart disease were the most common risk factors in patients with Acute NSTEMI-ACS. This is supported by research by Wahid, which stated that a history of hypertension and smoking were the main causes experienced by patients. (Wahid et al., 2019). Another study by Ludma also showed that diabetes mellitus contributes to the acceleration of the atherosclerosis process, endothelial dysfunction, and coronary microcirculation disorders, thereby increasing the vulnerability to partial occlusion of the coronary arteries which is the main mechanism of the NSTEMI (Ludma et al., 2024). Other findings by Shoaib are also in line with this study, which shows that non-thrombotic patients with a history of coronary heart disease have more complex clinical characteristics and tend to be in a higher risk group (Shoaib et al., 2021).

### **Distribution of TIMI Score Values in Patients with Non-ST Elevation Acute Coronary Syndrome**

The TIMI score plays a crucial role in estimating the risk of death in patients with NSTEMI, both within 30 days and up to one year after diagnosis. An increased TIMI score is associated with an increased risk of death, recurrent myocardial infarction, and recurrent severe ischemia requiring immediate revascularization within 14 days. Patients with a TIMI score greater than 3 are considered at risk for revascularization (Ajar et al., 2019). The majority of TIMI score results in this study were in the moderate category (68.1%). Ali's research states that the moderate risk category in TIMI scores is positioned between low risk and high risk (Ali et al., 2023). Another finding states that patients with a moderate TIMI score are included in the intermediate risk group who are recommended to receive intensive medical therapy accompanied by consideration of early invasive strategies, such as coronary angiography within 24–72 hours if there are no contraindications (Hoekstra & Cohen, 2009).

## **Distribution of MACE Events in Patients with Non-ST Elevation Acute Coronary Syndrome**

The results of the study showed that the incidence of MACE in patients with NSTEMI-ACS during the treatment period was still relatively high. Of the total 69 patients, 46 patients (66.7%) experienced MACE, while 23 patients (33.3%) did not experience MACE. These findings illustrate that patients with NSTEMI-ACS have a significant risk of cardiovascular complications in the acute phase of treatment. These results are in line with previous studies that reported that MACE events are often found in patients with acute coronary syndrome during treatment, including recurrent myocardial infarction, heart failure, stroke, and even death (Dkk, 2018). In addition, another study at Gotong Royong Hospital Surabaya showed that approximately 51.4% of patients with acute myocardial infarction experienced MACE, particularly related to components such as heart failure and arrhythmia, which shows consistency in the finding of a high incidence of MACE in patients with acute manifestations of coronary disease (Winda Diah Nugraheni, 2024).

The most common types of MACE found in this study were recurrent myocardial infarction and revascularization, each at 27.5%. Recurrent myocardial infarction was found in both diagnostic groups, while revascularization was performed more frequently in NSTEMI patients than in UAP. This is consistent with the findings of a meta-analysis by Chen that showed that a complete revascularization strategy compared to a culprit-only approach was associated with a reduction in MACE, including recurrent myocardial infarction, and mortality during the follow-up period (Chen et al., 2024). Another study by Stent showed that patients who survived one year after acute myocardial infarction and had received the latest generation of stents still had a risk of major cardiovascular events, such as recurrent myocardial infarction and revascularization, so medium to long-term clinical monitoring was still needed (Stents et al., 2021).

## **Relationship between TIMI Score and MACE Incidence**

The Gamma test results showed a very strong and significant positive relationship between the TIMI score category and the occurrence of MACE ( $r = 0.881$ ;  $p < 0.001$ ), where an increase in the TIMI score was followed by an increase in the risk of MACE. Clinically, most patients with low scores did not experience MACE, while those with medium and high scores had a significantly increased proportion of MACE, with all high scores experiencing MACE. This finding is consistent with various studies that reported

good discriminatory ability of the TIMI (AUC 0.868) in predicting MACE, including in 30-day observation and long-term outcomes after revascularization (Isfahani et al., 2025). TIMI components—such as age and atherosclerosis risk factors—reflect clinical conditions that contribute to major cardiovascular complications. Although some other scores have superior predictive performance, TIMI remains superior because of its simplicity, speed, and practicality, making it effective for initial risk stratification in patients with non-ST-elevation acute coronary syndromes (Sarda et al., 2020).

## CONCLUSION

Based on the results of the study on the relationship between TIMI scores and the incidence of MACE in patients with NSTEMI-ACS, it can be concluded that the majority of patients were male and diagnosed with NSTEMI, with moderate TIMI scores as the largest group. MACE events were more frequently found in patients with moderate and high TIMI scores compared to low scores. Statistical analysis showed a significant relationship between TIMI scores and MACE events ( $p < 0.001$ ), which confirms that the higher the TIMI score, the greater the risk of MACE in patients with Non-ST Elevation Acute Coronary Syndrome.

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